REMARKS

Status of the Claims

By this amendment, claims 1, 23 and 30 have been amended. Support for the amendments to claims 1, 23 and 30 can be found in the application as originally filed, *inter alia*, at page 10, lines 25-26; page 12, lines 19-21 and 1-5; page 17, lines 6-7; page 18, lines 12-13; page 42, lines 17-18; and claims 4 and 26. No new matter has been added.

Independent claim 1 has been amended to recite a process for producing an organic-inorganic hybrid glassy material, the process comprising the sequential steps of producing a gel body by a sol-gel method in which at least one kind of a silicon alkoxide containing a phenyl group is used as a sol-gel raw material; drying the gel body to obtain a dry gel; melting the dry gel by heating at a temperature not lower than softening temperature of the dry gel and not higher than 400°C into a melt; and aging the melt at a temperature of from 30°C to 400°C for a period of time of 5 minutes or longer.

Independent claim 1 corresponds to at least the first aspect of the present application (see page 5, lines 24-31) and Examples 1-1 to 1-5 (see page 16, lines 26-29). The product of the "gelation" recited at page 17, line 6, of the present application corresponds to "a gel body" recited in amended claim 1, and the product of the "drying" recited at page 17, line 7, of the present application corresponds to "a dry gel" recited in amended claim 1. Furthermore, "the gel body" recited at page 17, line 7, of the present application corresponds to "the dry gel" recited in amended claim 1, since this gel body is the product of the drying. With regard to the lower limit of the temperature of the melting not being lower than softening temperature of the dry gel, melting of the dry gel occurs only when the dry gel is heated at a temperature not lower than softening temperature of the dry gel. (See Page 12, Lines 19-21 and 1-5). Support for the limitation that the upper limit of the temperature of the melting is 400°C can be found, for example, in original claim 4.

Independent claim 23 has been amended to recite a process for producing an organic-inorganic hybrid glassy material, the process comprising the sequential steps of producing a gel body by a sol-gel method in which at least one kind of a silicon alkoxide containing a phenyl group is used as a sol-gel raw material; drying the gel body to obtain a dry gel; mixing the dry gel with a substance obtained by a non-aqueous acid-base reaction method to prepare a mixture; melting the mixture by heating at a temperature not lower than softening temperature of the dry gel and not higher than 400°C into a melt; and aging the melt at a temperature of from 30°C to 400°C for a period of time of 5 minutes or longer.

Independent claim 23 corresponds to at least the fourth aspect of the present application (see page 6, lines 20-28) and Examples 4-1 and 4-2 (see page 16, line 31 – page 17, line 1). Similar to amended claim 1, the product of the "gelation" recited at page 42, line 17, of the present application corresponds to "a gel body" recited in amended claim 23, and the product of the drying recited at page 42, line 18, of the present application corresponds to "a dry gel" recited in amended claim 23. Therefore, "the gel body" recited at page 42, line 28, of the present application corresponds to "the dry gel" recited in amended claim 23, since this gel body is the product of the drying. With regard to the lower limit of the temperature of the melting not being lower than softening temperature of the dry gel, melting of the dry gel occurs only when the dry gel is heated at a temperature not lower than softening temperature of the dry gel. (See Page 12, Lines 19-21 and 1-5). Support for the limitation that the upper limit of the temperature of the melting is 400°C can be found, for example, in original claim 26.

Independent claim 30 has been amended to recite a process for producing an organic-inorganic hybrid glassy material, the process comprising the sequential steps of producing a gel body by a sol-gel method in which a phenyltrialkoxysilane and a second silane are used as sol-gel raw materials, wherein the second silane is selected from the group consisting of

alkylalkoxysilanes and diphenyldialkoxysilanes; drying the gel body to obtain a dry gel; melting the dry gel by heating at a temperature not lower than softening temperature of the dry gel and not higher than 400°C into a melt; and aging the melt at a temperature of from 30°C to 400°C for a period of time of 5 minutes or longer.

Independent claim 30 corresponds to at least the first and second aspects of the present application, particularly to Examples 1-2 to 1-5, 2-1, and 2-11. Similar to amended claim 1, the product of the "gelation" recited at page 18, line 12, of the present application corresponds to "a gel body" recited in amended claim 30, and the product of the drying recited at page 18, line 12, of the present application corresponds to "a dry gel" recited in amended claim 30. Therefore, "the gel body" recited at page 18, lines 12-13, of the present application corresponds to "the dry gel" recited in amended claim 30, since this gel body is the product of the drying. With regard to the lower limit of the temperature of the melting not being lower than softening temperature of the dry gel, melting of the dry gel occurs only when the dry gel is heated at a temperature not lower than softening temperature of the dry gel. (See Page 12, Lines 19-21 and 1-5). Support for the limitation that the upper limit of the temperature of the melting is 400°C can be found, for example, at page 10, lines 25-26.

The organic-inorganic hybrid glassy material produced by the process of amended claim 1, 23, or 30 has a variety of special beneficial properties, as detailed on page 7, lines 12-30, of the present application, which are ***not*** obtainable by the cited references. For example, the presently claimed processes produce an organic-inorganic hybrid glassy material that simultaneously satisfies heat resistance, airtightness capability and ***low melting*** point characteristics. (See, for example, Page 7, Lines 12-15, of the Present Application). The process of amended claim 1, 23, or 30 comprises a step of melting the presently claimed dry gel at a temperature not lower than softening temperature of the dry gel and not higher than 400°C, which is not disclosed or suggested by the cited references.

Favorable consideration and allowance are respectfully requested for claims 1, 2, 4, and 23-35.

Claim Rejections Under 35 U.S.C. § 112

- I -

The rejection of claims 30-35 under 35 U.S.C. § 112, first paragraph, is respectfully traversed.

The Office Action asserts,

> The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 30, 31, and 34-35 recite "alkylalkoxysilanes and diphenyldialkoxysilanes". Although specific examples were provided in the examples, the examples do not provide sufficient support for the broader claim limitations of all alkylalkoxysilanes or diphenyldialkoxysilanes. Similarly, claims 30-32 and 34 recite "a phenyltrialkoxysilane". An example using phenyltriethoxysilane is not sufficient support for all phenyltrialkoxysilane. Furthermore, claims 32 and 33 recite "dialkyldialkoxysilane", which does not appear to be supported by the specification.

(Page 2).

The Office Action acknowledges that specific examples of "a phenyltrialkoxysilane", "alkylalkoxysilanes", and "diphenyldialkoxysilanes" were provided in the examples of the present application. In particular, with regard to "a phenyltrialkoxysilane", Examples 1-2 to 1-5, 2-1, and 2-11 specifically disclose "phenyltriethoxysilane ($PhSi(OEt)_3$)"; with regard to "alkylalkoxysilanes", Examples 1-2, 1-4, 1-5, 2-1, and 2-11 specifically disclose "methyltriethoxysilane ($MeSi(OEt)_3$), dimethyldiethoxysilane ($Me_2Si(OEt)_2$), diethyldiethoxysilane ($Et_2Si(OEt)_2$), and ethyltriethoxysilane ($EtSi(OEt)_3$)"; and with regard to "diphenyldialkoxysilanes", Example 1-3 specifically discloses "diphenyldiethoxysilane ($Ph_2Si(OEt)_2$)".

Further, the present application discloses that the organic-inorganic hybrid glassy material according to a second aspect contains at least one kind of

a substance represented by formula $R_nSiO_{(4-n)/2}$ (wherein R represents an organic functional group, such as a phenyl group or alkyl group, and n represents a number of from 1 to 3). (See Page 6, Lines 1-7; and Page 10, Lines 7-24) ***When n is 1, the formula $R_nSiO_{(4-n)/2}$ becomes $RSiO_{3/2}$, which is derived from a monoalkyltrialkoxysilane or monophenyltrialkoxysilane, provided that R is an alkyl group or phenyl group***, as explained below.

As the alkoxy groups of alkoxysilanes are high in reactivity, an alkoxy group of an alkoxysilane is converted into -OH by hydrolysis. Then, the resulting Si-OH (the other three arms of the silicon atom have been omitted for simplification) and Si-OH react with each other, thereby producing "Si-O-Si + H_2O". The oxygen atom that is bonded to two silicon atoms is derived from two hydroxy groups (i.e., two alkoxy groups). Thus, by the presently claimed process, two alkoxy groups react to provide one oxygen atom bonded to two silicon atoms (as well as H_2O). And when n is 1, the three alkoxy groups (of a ***trialkoxy***silane such as monoalkyl***trialkoxy***silane or monophenyl***trialkoxy***silane) each undergo the above-described reaction process, such that the oxygen atom of each of the three alkoxy groups is bonded to a second silicon atom, resulting in 3/2 oxygen atoms. In contrast with alkoxy groups, the organic functional group R (e.g., an alkyl group or phenyl group) is not reactive. Therefore, the organic functional group R remains unchanged by the presently claimed process (when n is 1).

Similarly, ***when n is 2, the formula $R_nSiO_{(4-n)/2}$ becomes R_2SiO, which is derived from a dialkyldialkoxysilane or diphenyldialkoxysilane, provided that R is an alkyl group or phenyl group***. Furthermore, ***when n is 3, the formula $R_nSiO_{(4-n)/2}$ becomes $R_3SiO_{1/2}$, which is derived from a trialkylmonoalkoxysilane or triphenylmonoalkoxysilane, provided that R is an alkyl group or phenyl group***.

Accordingly, "alkylalkoxysilanes" (meaning monoalkyltrialkoxysilanes, dialkyldialkoxysilanes, or trialkylmonoalkoxysilanes), "diphenyldialkoxysilanes", and "phenyltrialkoxysilane" recited in claim 30, are supported by, for example, page 10, lines 7-24, of the present application.

Accordingly, reconsideration and withdrawal of the rejection of claims 30-35 under 35 U.S.C. § 112, first paragraph, are respectfully requested.

- II -

The rejection of claims 32 and 33 under 35 U.S.C. § 112, second paragraph, is respectfully traversed.

The Office Action asserts,

> Claim 32 recites "the second silane is a dialkyldialkoxysilane". However, claim 32 is dependent on claim 30 and claim 30 already limits the second silane to a group "consisting of alkylalkoxysilanes and diphenyldialkoxysilanes". There is inconsistency between the two claims, wherein dimethyldiethoxysilane and diethyldiethoxysilane are an alkylalkoxysilane or a dialkyldialkoxysilane.

(Page 3).

As noted above, in claim 30, "alkylalkoxysilanes" means monoalkyltrialkoxysilanes, dialkyldialkoxysilanes, or trialkylmonoalkoxysilanes. Accordingly, as claim 32 recites that the second silane is a dialkyldialkoxysilane, there is no inconsistency between claims 30 and 32.

The Office Action further asserts,

> [T]he following compounds listed in claims 31, 33 and 35 are not the same as it appears in the specification. It unclear if they are the same compounds recited in examples 1-3, 1-4 and 1-5. The compound includes diphenyldiethoxysilane, dimethyldiethoxysilane, and diethyldiethoxysilane.

(Page 3).

The compounds listed in claims 31, 33 and 35 are the same compounds recited in Examples 1-3, 1-4 and 1-5. In particular, diphenyldiethoxysilane, dimethyldiethoxysilane and diethyldiethoxysilane are identical to diethoxydiphenylsilane, diethoxydimethylsilane, and diethoxydiethylsilane, respectively, recited in Examples 1-3, 1-4 and 1-5.

Accordingly, reconsideration and withdrawal of the rejection of claims 32 and 33 under 35 U.S.C. § 112, second paragraph, are respectfully requested.

Claim Rejections Under 35 U.S.C. § 102/103

- I -

The rejection of claims 1, 2 and 4 under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a) over U.S. Patent No. 5,608,123 ("Inoue") is respectfully traversed.

The Office Action asserts,

> Inoue discloses a process for producing a hybrid glassy material comprising producing a gel body by a sol-gel method using phenyltriethoxysilane as the sol-gel raw material and heating the gel body to a temperature of 120°C for 6 hours (col. 11 line 59 to col. 12 line 12), wherein this heating effectively melts the gel body and ages the melt, since the temperature and duration of the heating step similarly performed by the applicant as recited in the disclosure of the application.

(Page 4).

Inoue actually discloses that a gel body is produced by using phenyltriethoxysilane and tetraethoxysilane, followed by drying at 120°C for 6 hours to obtain polyorganosiloxane. (Column 11, Line 58 – Column 12, Line 11). The polyorganosiloxane obtained by Inoue is a dry gel.

Inoue does not disclose or suggest a process for producing an organic-inorganic hybrid glassy material, the process comprising the sequential steps of producing a gel body by a sol-gel method in which at least one kind of a silicon alkoxide containing a phenyl group is used as a sol-gel raw material; drying the gel body to obtain a dry gel; ***melting the dry gel by heating at a temperature not lower than softening temperature of the dry gel and not higher than 400°C into a melt***; and aging the melt at a temperature of from 30°C to 400°C for a period of time of 5 minutes or longer, as recited in claim 1. (See also Page 8, Line 4 – Page 9, Line 16, of the Present Application).

In Example 1-1 of the present application, the drying temperature was 100°C and the melting temperature was 120°C. (Page 17, Lines 7-8). Thus, the gel body (wet gel) obtained by the process of Inoue differs from that of the present application, as Inoue discloses 120°C as the drying temperature of the

gel body (wet gel), while the dry gel of the present application was melted at the surprisingly low temperature of 120°C.

Accordingly, reconsideration and withdrawal of the rejection of claims 1, 2 and 4 over Inoue are respectfully requested.

- II -

The rejection of claims 23-26 under 35 U.S.C. § 103(a) over Inoue in view of Niida et al., *J. Non-Crystalline Solids*, 306:292-99 (2002) ("Niida") is respectfully traversed.

The Office Action cites Niida merely for disclosure of "a precursor substance for low melting glass, obtained by a non- aqueous acid-base reaction method comprising Me_2SiO, P_20_5, and SnO". (Page 5). However, Niida fails to cure the above-noted deficiencies with regard to Inoue. In particular, Inoue in view of Niida does not disclose or suggest a process for producing an organic-inorganic hybrid glassy material, the process comprising the sequential steps of producing a gel body by a sol-gel method in which at least one kind of a silicon alkoxide containing a phenyl group is used as a sol-gel raw material; drying the gel body to obtain a dry gel; mixing the dry gel with a substance obtained by a non-aqueous acid-base reaction method to prepare a mixture; ***melting the mixture by heating at a temperature not lower than softening temperature of the dry gel and not higher than 400°C into a melt***; and aging the melt at a temperature of from 30°C to 400°C for a period of time of 5 minutes or longer, as recited in claim 23. (See also Page 8, Line 4 – Page 9, Line 16, and Page 16, Lines 13-19, of the Present Application).

Accordingly, reconsideration and withdrawal of the rejection of claims 23-26 over Inoue in view of Niida are respectfully requested.

- III -

The rejection of claims 30, 31, 34 and 35 under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a) over U.S. Patent Application Publication No. 2003/0124467 ("Minami '467") is respectfully traversed.

The Office Action asserts,

> Minami ['467] discloses a method [for] producing a glass material comprising producing a gel body by a sol gel method using phenyltriethoxysilane and diphenyldiethoxysilane as the raw materials and heating the gel to 200°C for at least 5 minutes ([0077], [0080], [0060]), wherein this heating effectively melts the gel body and ages the melt, since the temperature and duration of the heating step similarly performed by the applicant as recited in the disclosure of the application.

(Page 5).

Minami '467 actually discloses that the gel became fluid by drying the film at room temperature and then keeping the gelled film at 200°C for about 10 minutes, and that projections on the film were ***completely gelled and cured by further heating at 200°C for 20 minutes.*** (Paragraph [0060]). Accordingly, Applicants respectfully submit that in Example 1 of Minami '467, the gel was ***not*** melted, since the heating temperature (200°C) was lower than softening temperature of the gel, given that titanium-ethyl acetate (see paragraph [0051]) as a catalyst accelerated condensation.

Accordingly, Minami '467 does not disclose or suggest a process for producing an organic-inorganic hybrid glassy material, the process comprising the sequential steps of producing a gel body by a sol-gel method in which a phenyltrialkoxysilane and a second silane are used as sol-gel raw materials, wherein the second silane is selected from the group consisting of alkylalkoxysilanes and diphenyldialkoxysilanes; drying the gel body to obtain a dry gel; ***melting the dry gel by heating at a temperature not lower than softening temperature of the dry gel and not higher than 400°C into a melt***; and aging the melt at a temperature of from 30°C to 400°C for a period of time of 5 minutes or longer, as recited in claim 30.

Accordingly, reconsideration and withdrawal of the rejection of claims 30, 31, 34 and 35 over Minami '467 are respectfully requested.

- IV -

The rejection of claims 30, 32 and 33 under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a) over U.S. Patent Application Publication No. 2002/0160153 ("Minami '153") is respectfully traversed.

The Office Action asserts,

> Minami ['153] discloses a method [for] producing a glass material comprising producing a gel body by a sol gel method using phenyltriethoxysilane and dimethyldiethoxysilane as the raw materials and heating the gel to a temperature between 50 and 350°C for at least 5 minutes ([0060], [0061], [0055], [0056], [0048]), wherein this heating effectively melts the gel body and ages the melt, since the temperature and duration of the heating step similarly performed by the applicant as recited in the disclosure of the application and transparent amorphous film is obtained.

(Pages 5-6).

Minami '153 actually discloses that a sol-gel material solution (obtained by using, for example, phenyltriethoxysilane and dimethyldiethoxysilane) is poured onto a substrate, followed by (a) keeping the substrate at temperatures ranging from room temperature to 180°C for 5 to 120 minutes until the poured sol-gel material gets to have a predetermined viscosity, then (b) pressing a patterning die against the sol-gel film at a pressure of 0.5 to 120 kg/cm^2 for 60 seconds to 60 minutes to obtain a gel film with dehydration and polycondensation almost completed, and then (c) conducting a final heat treatment, for example, at 50 to 350°C for 10 to 150 minutes to polycondensate the residual silanol groups and to evaporate the water produced by the polycondensation. (Paragraphs [0048] and [0060]). Minami '153 further discloses further that, as a result, the volume of the film is slightly decreased in the thickness direction, whereby the film becomes a compact film. (Paragraph [0048]). Thus, the pattern of the film is ***not*** lost even with the final heat treatment at 50 to 350°C. Therefore, the gel film was not melted, since the gel film was not heated at a temperature not lower than softening temperature of the gel film.

Accordingly, Minami '153 does not disclose or suggest a process for producing an organic-inorganic hybrid glassy material, the process comprising the sequential steps of producing a gel body by a sol-gel method in which a phenyltrialkoxysilane and a second silane are used as sol-gel raw materials, wherein the second silane is selected from the group consisting of alkylalkoxysilanes and diphenyldialkoxysilanes; drying the gel body to obtain a

dry gel; ***melting the dry gel by heating at a temperature not lower than softening temperature of the dry gel and not higher than 400°C into a melt***; and aging the melt at a temperature of from 30°C to 400°C for a period of time of 5 minutes or longer, as recited in claim 30.

Accordingly, reconsideration and withdrawal of the rejection of claims 30, 32 and 33 over Minami '153 are respectfully requested.

Conclusion

In view of the foregoing amendments and remarks, the application is respectfully submitted to be in condition for allowance, and prompt, favorable action thereon is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the examination of the application.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket No. 038788.53357US).

Respectfully submitted,

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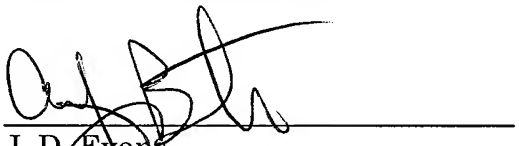

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